

A New Record of *Proreus simulans* (Dermaptera: Chelisochidae) in Korea

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ABSTRACT

The earwig *Proreus simulans* (Stål, 1860) has been recently reported from Jeollanam-do in the far southern section of the Korean Peninsula. Natural photographs of this species were obtained from Gwangyang Province for the first time in 2013, with specimens being physically collected in light traps from Suncheon Province in 2018. The species is widely distributed throughout the Oriental region, where its main habitat is lowland paddy fields. The earwig belongs to family Chelisochidae, subfamily Chelisochinae, and genus *Proreus*, which are newly recognized in Korea. The diversity of the order Dermaptera is currently estimated to be 6 families, 14 genera, and 24 species in Korea.

Keywords: Dermaptera, earwig, *Proreus simulans*, new record, checklist, Korea

INTRODUCTION

Since the first record of *Opisthocosmia komarowi* (now *Timonemus komarowi*) by Semenov (1901) in Korea, the diversity of the order Dermaptera has been summarized as containing 11 species in the study by Kamijo (1934), 16 species in the study by Cho (1969), and 17 species in the study by Kim and Moon (1985). However, a number of new species or newly recorded species have occasionally been reported, including *Gonolabis distincta* (now *Mongolabis distincta*) in a study by Moon (1993), *Challia taewooi* and *C. gigantia* in a study by Nishikawa (2006a), *Anisolabis seiokui* in a study by Nishikawa (2008), *Labia minor* in a study by Nishikawa and Han (2015), and *Spongovostox sakaii* in a study by Kim and Nishikawa (2017).

An unrecognized earwig was photographed by the second author of the present study in Gwangyang Province in the southern part of the Korean Peninsula in 2013 (Fig. 1A, B). It was temporarily identified as *Proreus simulans* by the first author; however, owing to the specimen not being physically collected at the time, only the photographs were privately presented on an internet blog (Kim, 2018). Since then, collection attempts of this species to confirm its occurrence in the same locality have failed. Finally, this species was collect-

ed in light traps in 2018 from the neighboring southern locality, Suncheon Province. Consequently, its characters were studied in detail and its identity confirmed in the present study as *Proreus simulans*. The Oriental earwig belongs to family Chelisochidae, subfamily Chelisochinae, and genus *Proreus*, which are newly recorded in Korea. In the present study, the systematic terminology used is that referred to by Steinmann (1986).

SYSTEMATIC ACCOUNTS

Order Dermaptera De Geer, 1773

¹*Family Chelisochidae Verhoeff, 1902

Diagnosis. Body stout or robust, moderately depressed; antennomeres cylindrical or subcylindrical, 4th usually shorter than 3rd, often subconical; pronotum generally widened posteriorly and rarely transverse; tegmina perfect or abbreviated, keeled or smooth; wings generally well developed; legs rather short and compressed; 2nd tarsomere with narrow ventral lobe produced beneath 3rd tarsomere.

Distribution. Ethiopian, Oriental, and Indo-Australian regions (three subfamilies). New to Korea.

Korean name: ¹*열대집게벌레과(신칭)

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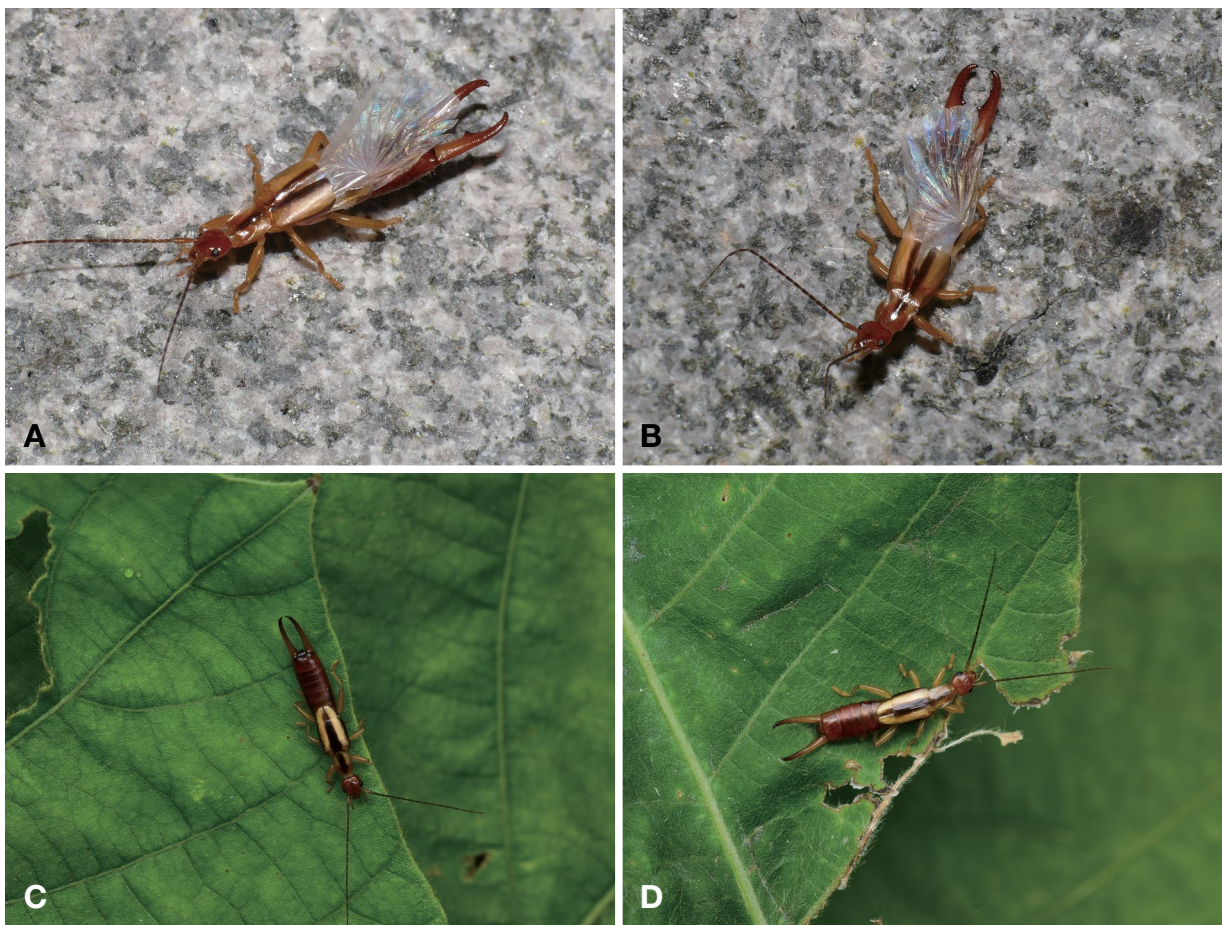


Fig. 1. Natural photographs of *Proreus simulans*. A, B, Male (31 Jul 2013, Gwangyang Province); C, D, Female (12 Sep 2018, Suncheon Province).

¹*Subfamily Chelisochinae Verhoeff, 1902

Diagnosis. Head with well-marked postfrontal and coronal sutures; tegmina and wings present, lateral margin of tegmina without ridge-like edge; posterior margin transverse or obliquely truncate; wings absent or sometimes fully developed; tibiae not obviously flattened laterally, or sulcate or flattened only at distal apex. Male genitalia well developed, distal lobe prominent; external parameres vary.

Distribution. Ethiopian, Oriental, and Indo-Australian regions (13 genera). New to Korea.

²*Genus *Proreus* Burr, 1907

Proreus Burr, 1907: 129; 1910: 136; 1911: 64; Bey-Bienko, 1936: 117; Srivastava, 1976: 49; Steinmann, 1993: 99; Chen and Ma, 2004: 195.

Type species: *Forficula simulans* Stål, 1860.

= *Erotosis* Burr, 1910: 114 (type species: *Spongiphora sphinx* Burr, 1900).

Diagnosis. Body slender and small; antennae slender, cylindrical, 5th antennomere longer than 3rd; 4th antennomere cylindrical or ovate, never clubbed nor conical; tegmina and wings developed; legs moderately short; tibiae with groove or at least flattened near extreme; abdomen cylindrical, lateral sides gently curved; forceps well developed; male parameres typical, with basal vesicle.

Distribution. Oriental and Indo-Australian regions (18 species). New to Korea.

³**Proreus simulans* (Stål, 1860) (Figs. 1–3)

Forficula simulans Stål, 1860: 302 (type locality: Java, male, type deposited in Naturhistoriska riksmuseet, Stockholm).

Forficula modesta Stål, 1860: 302 (type locality: Hongkong,

Korean name: ¹*열대집게벌레아과 (신칭), ²*폴집게벌레속 (신칭), ³*폴집게벌레 (신칭)

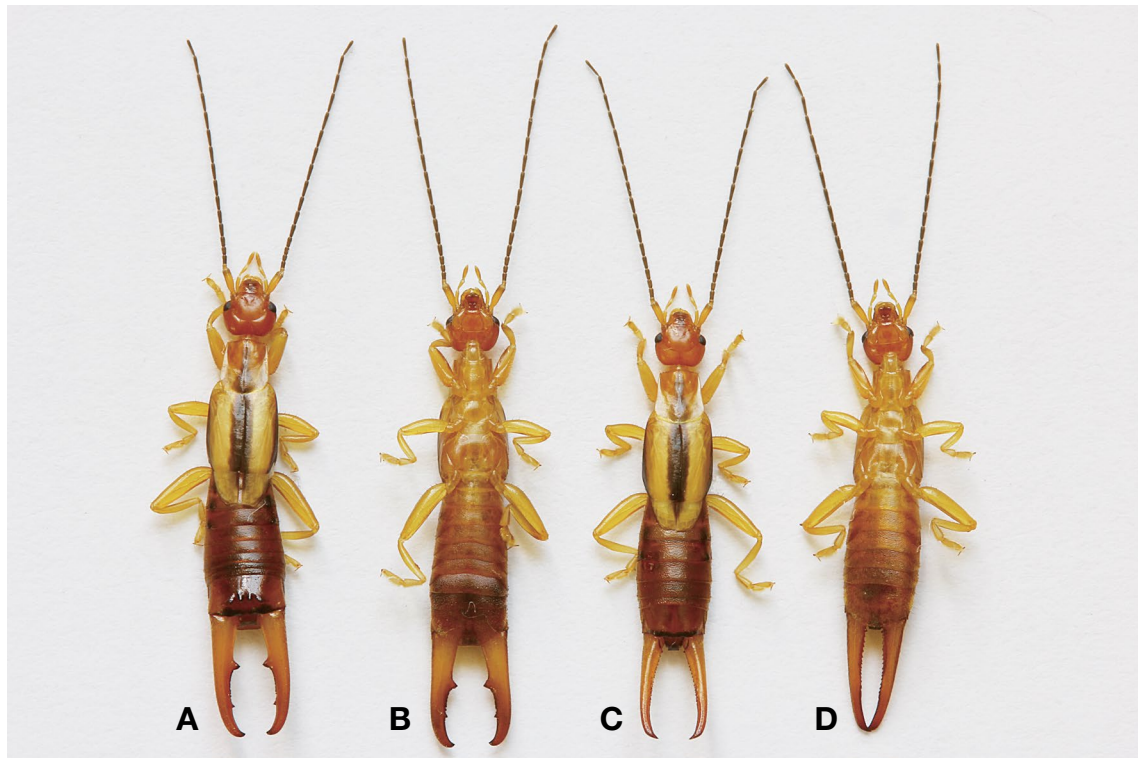


Fig. 2. Habitus of *Proreus simulans*. A, Male dorsal view; B, Male ventral view; C, Female dorsal view; D, Female ventral view.

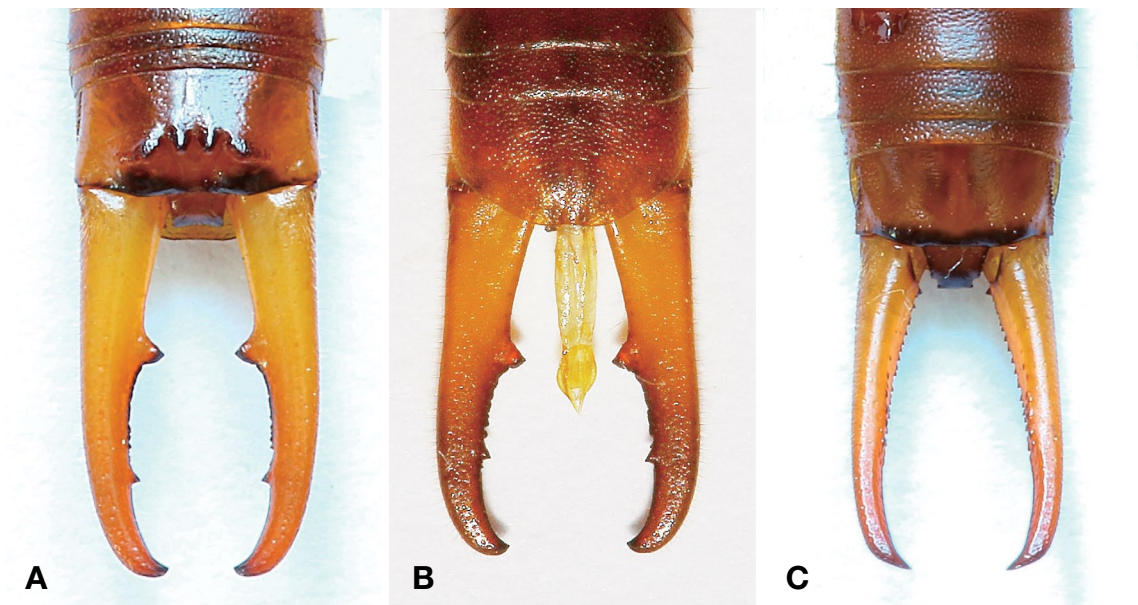


Fig. 3. Terminalia of *Proreus simulans*. A, Male forceps dorsal view; B, Male genitalia extracted between forceps ventral view; C, Female forceps dorsal view.

male). [synonymized by Burr, 1911]
Lobophora simulans: Dohrn, 1865: 74.
Lobophora modesta: Dohrn, 1865: 74. [synonymized by Burr,

1911]
Chelisoches simulans: Scudder, 1876: 309; Bormans and
 Krauss, 1900: 87, fig. 34; Kirby, 1904: 34.

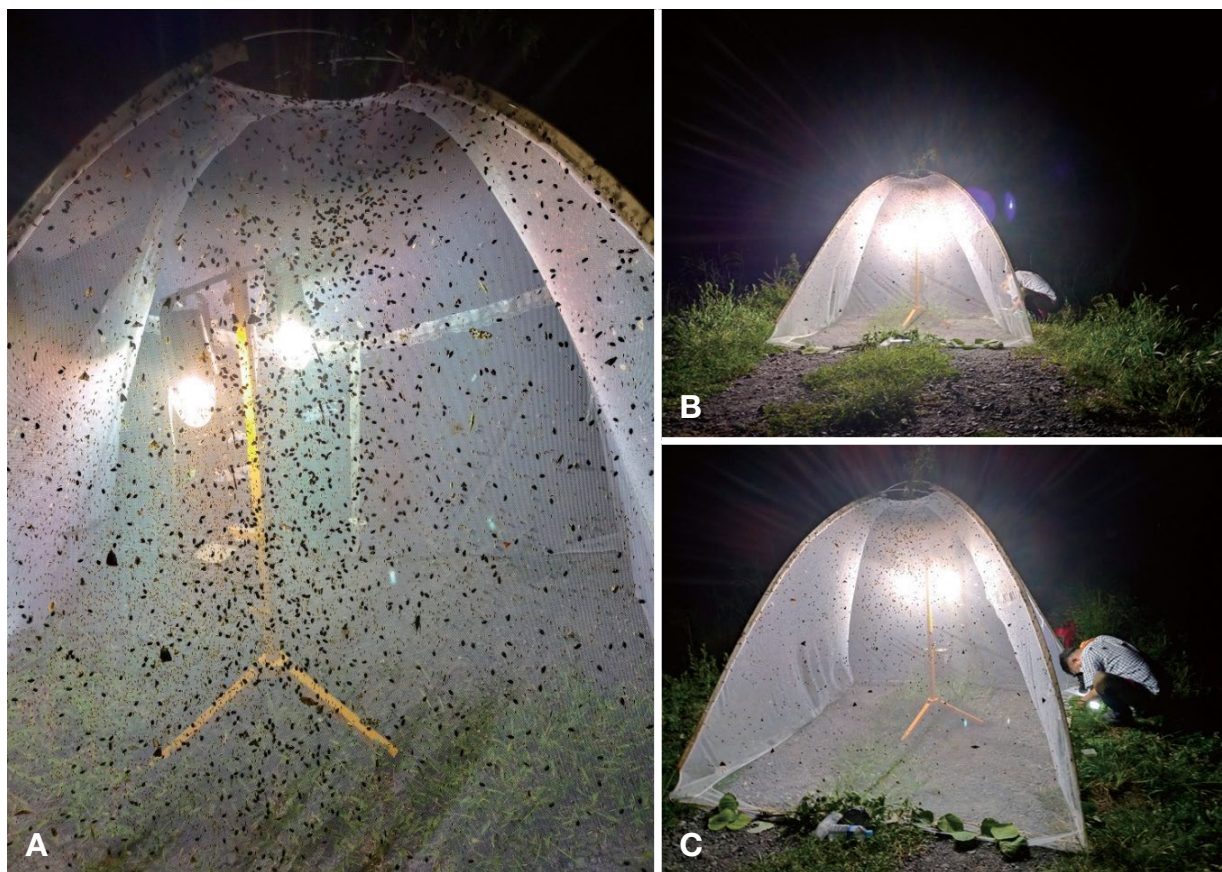


Fig. 4. Collection method (light trap).

Spongiphora sphinx Burr, 1900: 91 (type locality: Sarawak, Male and Female). [synonymized by Burr, 1911]

Labidurodes formosanus Shiraki, 1906a: 92, fig. 2 (type locality: Formosa, Female not male, see Nishikawa, 2005). [synonymized by Shiraki, 1928]

Labidurodes okinawaensis Shiraki, 1906b: 189 (type locality: Okinawa, Male and Female). [synonymized by Burr, 1913]

Proreus simulans: Burr, 1907: 131; 1910: 137, fig. 85; 1911: 64, Pl. 5, fig. 21, Pl. 6, fig. 3; 1916: 9, Pl. 2, fig. 8; Shiraki, 1928: 14; Bey-Bienko, 1936: 118; Nishikawa, 1975: 66; 1996: 119; 2005: 1, figs. 1–3, 7–10; 2016: 182, figs. 08–09, -10, -11; Srivastava, 1976: 50; Barrion and Litsinger, 1985: 25; Sakai, 1986: 21 (1101), 71 (1151); 1987: 1240, Pl. 20, 1243–1, Pl. 24; 1989: 151, Pl. 16, fig. 87; 2000a: 192; 2000b: 49; Azuma et al., 1987: 189; Hirashima, 1989: 60; Steinmann, 1993: 112, figs. 181–183; Chou, 1998: 160; Chen and Ma, 2004: 197, fig. 97a–c, Pl. IV–15.

Erotesis sphinx: Burr, 1910: 114. [synonymized by Burr, 1911]

Redescription. Body smaller, slender. General coloration orange-red or yellowish-brown, varied with tawny; tegmina and wings yellowish-orange with median dark black margins, legs yellow, forceps red-brown. Head depressed, orange-red; frons slightly tumid; postfrontal sutures and coronal suture distinct, posterior margin weakly concave; compound eyes small, black, considerably shorter than length of head behind eyes; antennae darkish, 17–19 segmented; scape thickly well developed, yellow cylindrical, elongate, narrower in base, as long as distance between both antennal cavities; pedicel smallest, quadrate; 3rd antenomere slightly longer than 4th; 5th antenomere almost as long as 3rd; remaining flagellums more elongated, all cylindrical and slender; maxillary and labial palps bright yellow. Pronotum depressed, orange-red, 1.2 times longer than wide; longitudinal furrow distinct, darkish; anterior margin truncate, slightly narrower than posterior margin of head, anterior angle obtuse; posterior margin slightly widened, convex, posterior angles rounded; lateral margins straight; prozona 1.2 times longer than metazona. Prosternum 2 times longer than wide with posterior margin truncated; mesosternum as long as wide, wider than proster-



Fig. 5. Map of collection location (Jeollanam-do, Suncheon-si, Haeryong-myeon, 522-1 Nongju-ri).

num with posterior margin truncated; metasternum shorter than wide, wider than mesosternum with posterior margin emarginated. Tegmina orange-yellow, rather narrow, as long as combined lengths of head and pronotum, narrow dark band along the suture and costal fields on lateral margins; lateral ridge absent; posterior margin truncate; wings prominent, surpassing tegmina, covering on 3rd abdominal tergite, transparent when fully expanded. Legs short, orange-yellow; lengths $1st < 2nd < 3rd$; tibiae adequately shorter than femora; 2nd tarsomere smallest with a narrow ventral lobe prolonged beneath 3rd; 1st tarsomere as long as 3rd; claws simple, symmetrical; arolium not developed. Abdomen red-brown, rather broad, dilated in the middle; lateral glandular folds distinct on 3–4 tergites, more blackish dark; forceps well developed, stout and larger in male.

Male (Figs. 2A, B, 3A, B): Length with forceps 14.5–14.7 mm, tegmina 2.7–2.8 mm, forceps 3.5–3.8 mm. Ultimate tergite broad, rectangular, pair of small compressed tubercles in the middle, and crenulated obtuse projections on each side; posterior margin gently sinuate; pygidium small and short, transverse rectangular; penultimate sternite broadly rounded with posterior margin narrowly truncated; forceps depressed with straight outer margins and branches remote at the base, thick more proximally rather than gradually slender towards apex, incurved and weakly upcurved; inner margin with sharp triangular big tooth near median portion, and second smaller tooth near apex; inner margin smooth from base to big tooth, crenulated between both teeth, almost smooth from smaller

tooth to apex. Genitalia (Fig. 3B) very narrow shaped; virga within genital lobe very long; external parameres moderately broad at distal part, very acuminate apex.

Female (Figs. 2C, D, 3C): Length with forceps 13.4–14.5 mm, tegmina 2.6–3.1 mm; forceps 3.5–4.0 mm. Similar to male in size and coloration, sexual differences not significant. Ultimate tergite without remarkable tubercles in the middle, hardly crenulated obtuse projections on each sides; posterior margin gently sinuate; pygidium slightly larger than male, transverse trapezoidal, posterior margin narrowly truncated with acute lateral angular marginations; penultimate sternite broadly rounded; forceps almost straight, gradually slender towards apex, incurved and weakly upcurved; inner margin without big tooth, but serrulated two-thirds from the base to apex as double rows among these dorsal, one scarce only presented in middle portion.

Material examined (8 specimens). Korea: 2 males and 6 females, Jeollanam-do, Suncheon-si, Haeryong-myeon, 522-1 Nongju-ri, light trap, 12 Sep 2018, leg. Kim Sangsu (voucher specimens deposited in the National Institute of Biological Resources).

Distribution. New to Korea (Jeollanam-do: Gwangyang, Suncheon), China (Guangxi, Hainan, Yunnan, Hongkong), Japan (Ryukyu Islands), Taiwan, Philippines, Vietnam, Myanmar, Thailand, Malaysia, Singapore, India, Indonesia (Borneo, Java, Sumatra), Bismarck Islands: widely distributed throughout the Oriental region.

Remarks. This species is mainly found in or near lowland

Table 1. Checklist of Korean Dermaptera

	Family	Subfamily	Species	Type locality	First Korean record
1	Pygidicranidae	Challinae	<i>Challia fletcheri</i> Burr, 1904	China	Burr, 1904: 286 (?)
2	Pygidicranidae	Challinae	<i>Challia gigantea</i> Nishikawa, 2006a	China: Liaoning, Korea	Nishikawa, 2006a: 31
3	Pygidicranidae	Challinae	<i>Challia kyusani</i> Moon and Kim, 1985	Korea: Mt. Seoraksan	Moon and Kim, 1985: 58
4	Pygidicranidae	Challinae	<i>Challia taewooi</i> Nishikawa, 2006a	Korea: Mt. Surisan	Nishikawa, 2006a: 24
5	Anisolabididae	Anisolabidinae	<i>Anisolabella marginalis</i> (Dohrn, 1864)	Japan	Shiraki, 1928: 7
6	Anisolabididae	Anisolabidinae	<i>Anisolabis maritima</i> (Bonelli, 1832)	Italy ^a	Kamijo, 1934: 177
7	Anisolabididae	Anisolabidinae	<i>Anisolabis seirokui</i> Nishikawa, 2008	Japan: Tokushima, Korea	Nishikawa, 2008: 35
8	Anisolabididae	Anisolabidinae	<i>Euborellia annulata</i> (Fabricius, 1793)	Americae meridionalis ^a	–
9	Anisolabididae	Anisolabidinae	= <i>Anisolabis pallipes</i> Shiraki, 1906 ^b	Japan: Takasago	Cho, 1969: 807
10	Anisolabididae	Anisolabidinae	<i>Euborellia annulipes</i> (Lucas, 1847)	France: Paris ^a	Kamijo, 1934: 177
11	Anisolabididae	Anisolabidinae	<i>Euborellia plebeja</i> (Dohrn, 1863)	Java ^a	Moon and Kim, 1983: 37
12	Anisolabididae	Labidurinae	<i>Mongolabis distincta</i> (Nishikawa, 1969)	Japan: Chabana Is	Moon, 1993: 273
12_1	Labiduridae	Labidurinae	<i>Labidura riparia riparia</i> (Pallas, 1773)	Russia: Irtysh River ^a	Wu, 1935: 598
13	Spongiphoridae	Labidurinae	<i>Labidura riparia japonica</i> (de Haan, 1842)	Japan	Okamoto, 1924: 53
14	Spongiphoridae	Labiinae	<i>Labia minor</i> (Linnaeus, 1758)	Europe ^a	Nishikawa and Han, 2015: 2
15	Spongiphoridae	Labiinae	<i>Paralabellula curvicauda</i> (Motschulsky, 1863)	Sri Lanka ^a	Kamijo, 1934: 178
16	Chelisochoidea	Spongiphorinae	<i>Spongovostox sakaii</i> Nishikawa, 2006b	Japan: Amami-Oshima	Kim and Nishikawa, 2017: 114
17	Forficulidae	Chelisochinae	<i>Proreus simulans</i> (Stål, 1860)	Java	Present study
18	Forficulidae	Anechurinae	<i>Anechura harmandi</i> (Burr, 1904)	Japan	Moon, 1985: 115
19	Forficulidae	Anechurinae	= <i>Odontopsalis lewisii</i> Burr, 1904 ^c	Japan	Cho, 1969: 810
20	Forficulidae	Anechurinae	<i>Anechura japonica</i> (Bormans, 1880)	Japan	Semenov, 1908: 171
21	Forficulidae	Anechurinae	= <i>Anechura eoa</i> Semenov, 1902 ^d	Russia	Semenov, 1902: 100
22	Forficulidae	Anechurinae	= <i>Anechura queiparta</i> Okamoto, 1924 ^e	Korea: Jeju-do	Okamoto, 1924: 53
23	Forficulidae	Anechurinae	<i>Forficula auricularia</i> Linnaeus, 1758	Europe ^a	Han, 1982: 424
24	Forficulidae	Anechurinae	<i>Forficula mikado</i> Burr, 1904	Japan	Kamijo, 1934: 177
25	Forficulidae	Anechurinae	<i>Forficula scudderii</i> Bormans, 1880	Japan	Shiraki, 1928: 20
26	Forficulidae	Anechurinae	= <i>Forficula robusta</i> Semenov, 1908 ^f	Russia: Vladivostok	Semenov, 1908: 166
27	Forficulidae	Anechurinae	<i>Forficula vicaria</i> Semenov, 1902	Korea: Koseong	Semenov, 1902: 99
28	Forficulidae	Opisthocosminae	<i>Eparchus yezoensis</i> (Matsumura and Shiraki, 1905)	Japan: Sapporo	Cho, 1969: 812
29	Forficulidae	Opisthocosminae	<i>Timomenus komarowi</i> (Semenov, 1901)	Korea: Seodaegu	Semenov, 1901: 98

^aCosmopolitan. ^bSrivastava, 2003: 60. ^cSakai, 1973: 160. ^dBurr, 1911: 73. ^eSakai, 1989: 152. ^fBurr, 1911: 81.

paddy fields (Fig. 5), the macropterous forms are well attracted into light traps as shown in this collection (Fig. 4A–C). Earwigs often hide inside grass leaves during daytime to use as refuge or main habitats, and thus regarded as important predator of leaf folders (*Pelopidas mathias*) on rice or as the natural enemy of the Oriental maize borer (*Ostrinia furnacalis*) in the Philippines (Barrion and Litsinger, 1985). However, earwigs are regarded as a nuisance when they fly in mass populations inside houses (Nishikawa, 2016).

DISCUSSION

Korean Dermaptera was intensively studied between 1983 and 1995 (Moon and Kim, 1983, 1985a, 1985b, 1991; Kim and Moon, 1985; Moon, 1985, 1993; Moon and Lee, 1995a, 1995b). However, owing to it being a smaller order with only a few species for taxonomic study was standing still on the way in Korea, besides which concern was shift towards conservation studies (Yoon and Moon, 1996, 1997).

Because more than 20 years has passed since that period, it is informative to present a brief list of the Dermaptera species found in Korea (Table 1). There are some questionable species contained in this list in which the real specimens have not been reconfirmed since the first records, for example *C. fletcheri*, *F. auricularia*, *F. mikado*, and *Eparchus yezoensis* (see Moon and Kim, 1991; Nishikawa, 2006a). However, it is reasonable to maintain these species in this list if there is no clear evidence for it to be excluded from the Korean fauna. Because the Korean Peninsula has been divided into two political countries since 1945, this order has not been comprehensively studied throughout North Korea. Besides, the cosmopolitans or Oriental earwigs have recently been found in South Korea (Kim and Nishikawa, 2017), which have been continuously reported. The current diversity of the order Dermaptera is estimated to be 6 families, 14 genera, and 24 species (including 1 subspecies) in Korea.

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REFERENCES

- Azuma S, Hori S, Kinjo M, Minato K, Murayama N, Uesugi K, 1987. Field guide book to the insects of Okinawa. Vol. IV. Okinawa Shuppan, Urasoe, Okinawa, pp. 1-249.
- Barrion AT, Litsinger JA, 1985. *Proreus simulans* (Dermaptera: Chelisochidae), a predator of rice leaffolder (LF) and skipper larvae. International Rice Research Newsletter, 10:1-25.
- Bey-Bienko GJ, 1936. Insectes Dermapteres. Faune de l'URSS, Nouvelle series, 5. Publishing House of the USSR Academy of Sciences, Moscou & Leningrad, pp. 1-239.
- Bonelli FA, 1832. Forficula maritima. In: Saggio di una Monografia delle Forficule indigene (Ed., Gene G). Annali delle Scienze del Regno Lombardo-Veneto, 2:215-228.
- Bormans A, 1880. Etude sur quelques Dermapteres exotiques. Anales de la Sociedad Espanola de Historia Natural, Madrid, 9:505-515.
- Bormans A, Krauss H, 1900. Forficulidae und Hemimeridae. Das Tierreich, 11. Verlag von R. Friedländer und Sohn, Berlin, pp. 1-142.
- Burr M, 1900. Notes on the Forficularia. IV. On a collection of Forficularia from Sarawak. Annals and Magazine of Natural History, 6:88-101.
- Burr M, 1904. Observations on the Dermaptera, including revisions of several genera and descriptions of new genera and species. Transactions of the Entomological Society of London, 1904:277-322.
- Burr M, 1907. A preliminary revision of the Forficulidae (sensu stricto) and of the Chelisochidae, families of the Dermaptera. Transactions of the Entomological Society of London, 55:91-134.
- Burr M, 1910. The fauna of British India, including Ceylon and Burma. Dermaptera (Earwigs). Taylor and Francis, London, pp. 1-217.
- Burr M, 1911. Dermaptera. In: Genera Insectorum, Fascicule, 122 (Ed., Wytsman PAG). Wytsman, Bruxelles, pp. 1-112.
- Burr M, 1916. On the male genital armature of the Dermaptera. Part III: Eudermaptera. Journal of the Royal Microscopical Society, 1916:1-18.
- Chen YX, Ma WZ, 2004. Dermaptera. Fauna Sinica Insecta, Vol. 35. Science Press, Beijing, pp. 1-420.
- Cho PS, 1969. Order Dermaptera. In: Illustrated encyclopedia of fauna and flora of Korea, 10, Insecta (II) (Ed., Ministry of Education). Samhwa Publishing Co., Seoul, pp. 801-816.
- Chou L-Y, 1998. A check list of Dermaptera (Insecta) of Taiwan. Journal of Agricultural Research of China, 47:159-163.
- Dohrn H, 1863. Versuch einer Monographie der Dermapteren. Stettin Entomologische Zeitung, 24:309-322.
- Dohrn H, 1864. Versuch einer Monographie der Dermapteren. Stettin Entomologische Zeitung, 25:285-296.
- Dohrn H, 1865. Versuch einer Monographie der Dermapteren. Stettin Entomologische Zeitung, 26:68-99.
- Fabricius JC, 1793. Entomologia Systematica Emendata et Aucta, secundum Classes, Ordines, Genera, Species, adjectis

- Synonymis, Locis, Observationibus, Descriptionibus. Tome 2. C. G. Proft, Hafniae, pp. 1-519.
- Geer C de, 1773. Memoires pour servir a l'Histoire des Insectes [tome troisieme]. L.L. Grefing, Stockholm, pp. 1-696.
- Haan W de, 1842. Bijdragen tot de Kennis der Orthoptera: Dermaptera. In: Verhandelingen over de natuurlijke Geschiedenis der Nederlandsche overzeesche bezittingen, door de Leden der Natuurkundige commissie in Oost-Indie en andere Schrijvers, Zoologie (Ed., Temminck CJ). In commissie bij S. en J. Luchtmans en C.C. van der Hoek, Leiden, pp. 238-243.
- Han JK, 1982. Dictionary of the names for Chinese and Korean animals. Science Publication, Beijing, p. 424.
- Hirashima Y, 1989. 15. Dermaptera. In: A check list of Japanese insects (Eds., Morimoto K, Tadauchi O, Saito H). Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka and Wildlife Research Center, Tokyo, pp. 59-60.
- Kamijo S, 1934. Miscellany of Korean Dermaptera. Journal of Chosen Natural History, 19:176-178.
- Kim CW, Moon TY, 1985. A taxonomic revision of Korean Dermaptera. Entomological Research Bulletin (Korea), 11:37-59.
- Kim SS, 2018. Journey to Forest with Dachori. Naver blog [Internet], Accessed Oct 1 2018, <<https://dachori.blog.me/130173452952>> .
- Kim T, Nishikawa M, 2017. Notes on the earwig family Spongiphoridae (Insecta: Dermaptera), with a new record of *Spongovostox sakaii* in Korea. Animal Systematics, Evolution and Diversity, 33:112-122. <https://doi.org/10.5635/ASED.2017.33.2.001>
- Kirby WF, 1904. A synonymic catalogue of Orthoptera. Vol. 1. Orthoptera Euplexoptera, Cursoria, et Gressoria (Forficulidae, Hemimeridae, Blattidae, Mantidae, Phasmidae). British Museum (Natural History), London, pp. 1-501.
- Linnaeus C, 1758. Systema Naturae per Regna Tria Naturae, Secundum Classes, Ordines, Genera, Species, cum Characteribus, Differentiis, Synonymis, Locis. Vol. 1. Reformata. 10th ed. Salviae, Holmiae [Stockholm], pp. 1-824.
- Lucas MH, 1847. Communications. Annales de la Société Entomologique de France, 2:84-85.
- Matsumura S, Shiraki T, 1905. Monographie der Forficuliden Japans. Journal of Sapporo Agricultural College, 2:75-86.
- Moon TY, 1985. The systematic study of Korean Dermaptera II. Genus *Anechura* Scudder (Forficulidae). Insecta Koreana, 5:113-118.
- Moon TY, 1993. *Gonolabis distincta* (Nishikawa) new to Korea (Anisolabididae, Dermaptera). Korean Journal of Entomology, 23:273-276.
- Moon TY, Kim CW, 1983. The systematic study on the Korean Dermaptera, I. (Carcinophorinae: Carcinophoridae). Entomological Research Bulletin (KEI), 9:29-42.
- Moon TY, Kim CW, 1985a. A review of the Far-east Palaearctic genus *Challia* Burr, including a new species *Challia kysani* sp. nov. (Challinae: Dermaptera). Korean Journal of Entomology, 15:57-60.
- Moon TY, Kim CW, 1985b. A systematic study of Korean Dermaptera III, a review of genus *Forficula* Linnaeus with a redescription of *F. vicaria* Semenov, 1902 (Forficulidae). Korean Journal of Entomology, 15:1-5.
- Moon TY, Kim CW, 1991. Catalogue of Korean Dermaptera. Entomological Research Bulletin (KEI), 17:67-79.
- Moon TY, Lee JE, 1995a. Review of taxonomy and distribution of insects from province Kungsangbuk-do, I. Dermaptera. Bulletin of Basic Science of Andong National University, 6:75-86.
- Moon TY, Lee JW, 1995b. Taxonomy on Dermaptera of Yeungnam University. Journal of Natural Sciences, 15:273-283.
- Motschulsky V de, 1863. Essai d'un catalogue des insectes de l'île Ceylon. Bulletin de la Societe Imperiale des Naturalistes de Moscou, 36:1-153.
- Nishikawa M, 1969. Notes on the Carcinophorinae of Japan and the Ryukyus (Dermaptera: Carcinophoridae). Kontyû, 37: 41-55.
- Nishikawa M, 1975. Dermaptera. In: Pictorial encyclopedia of insect III for student (Ed., Ishihara T). Gakken Co. Ltd., Tokyo, pp. 65-66 (pls.), 187-383 (in Japanese).
- Nishikawa M, 1996. Dermaptera. In: The encyclopedia of animals in Japan VIII (Insect I) (Ed., Hidaka T). Heibonsha Ltd. Pub., Tokyo, pp. 118-120 (in Japanese).
- Nishikawa M, 2005. Identity of the earwig recorded as *Proreus simulans* (Dermaptera: Chelisochidae) from Watarase-Yusui-chi, Tochigi Prefecture, Japan. Tettigonia, 7:1-8.
- Nishikawa M, 2006a. Notes on the Challinae (Dermaptera, Pygidicranidae), with descriptions of three new species from China, Korea and Japan. Japanese Journal of Systematic Entomology, 12:17-38.
- Nishikawa M, 2006b. Two new species of the family Spongiphoridae (Insecta, Dermaptera) from the Ryukyus, Japan, with notes on the late Dr. Sakai's work on Dermaptera in 1999. Biogeography, 8:25-34.
- Nishikawa M, 2008. A new species of the genus *Anisolabis* from Japan and Korea, with notes on the nomenclatural problem of two subspecific names of *Anisolabis maritima* (Bonelli) (Dermaptera: Anisolabididae). Insecta Matsumurana, New Series, 64:35-51.
- Nishikawa M, 2016. Dermaptera. In: The standard of Polyneoptera in Japan (Ed., Orthopterological Society of Japan). Gakken Plus, Tokyo, pp. 170-186 (in Japanese).
- Nishikawa M, Han C, 2015. Record of Dermaptera from DPR Korea. Tettigonia, 10:1-6.
- Okamoto H, 1924. The insect fauna of Quelpart island (Saishiu-to). Bulletin of the Agricultural Experiment Station, Government-General of Chosen, 1:1-187.
- Pallas PS, 1773. Reise durch Verschiedene Provinzen des Russischen Reiches in den Jahren 1768-74. St. Petersburg Anbang, pp. 701-727.
- Sakai S, 1973. Dermapterorum Catalogus Praeliminaris. VII: A basic survey for numerical taxonomy of the Forficulidae, the Dermaptera of the world. Special Bulletin of Daito Bunka

- University, 6:1-357.
- Sakai S, 1986. Dermapterorum Catalogus XIX: Iconographia IV. a. The illustration series of the Chelisochidae for integrated taxonomy of the Dermaptera of the world. Bulletin of Daito Bunka University, 24:103.
- Sakai S, 1987. Dermapterorum Catalogus XIX: Iconographia IV. b. The illustration series of the Chelisochidae for integrated taxonomy of the Dermaptera of the world. Special Bulletin of Daito Bunka University, 32:1184-1243-1.
- Sakai S, 1989. Some interesting problems on Japanese Dermaptera with reference to the check list of Dermaptera of Japan. Bulletin of Biogeographical Society of Japan, 44:151-155.
- Sakai S, 2000a. A basic survey for integrated taxonomy of the Dermaptera of the world. Forficula, Vol. 5. The Author, Tokyo, pp. 1-369.
- Sakai S, 2000b. A basic survey for integrated taxonomy of the Dermaptera of the world. Forficula, Vol. 6. The Author, Tokyo, pp. 1-174.
- Scudder SH, 1876. Critical and historical notes on the Forficulidae; including descriptions of new generic forms and an alphabetical synonymic list of the described species. Proceedings of the Boston Society of Natural History, 18:287-332.
- Semenov A, 1901. First Palaearctic representative of the genus *Opisthocosmia* H. Dohrn (Orthoptera, Forficulidae). Revue Russe d'Entomologie, 1:98-100.
- Semenov A, 1902. Dermaptoptera nova aut minus cognita I. Revue Russe d'Entomologie, 2:99-102.
- Semenov A, 1908. Dermaptoptera nova aut minus cognita III. Revue Russe d'Entomologie, 8:159-173.
- Shiraki T, 1906a. Neue Forficuliden Japans. Transactions of the Sapporo Natural History Society, 1:91-96.
- Shiraki T, 1906b. Neue Forficuliden und Blattiden Japans. Transactions of the Sapporo Natural History Society, 1:183-196.
- Shiraki T, 1928. Dermapteren aus dem Kaiserreich Japan. Insecta Matsumurana, 3:1-25.
- Srivastava GK, 1976. Catalogue of Oriental Dermaptera. Records of the Zoological Survey of India, Occasional Paper, 2:1-94.
- Srivastava GK, 2003. The fauna of India and the adjacent countries: Dermaptera (Part II). Superfamily Anisolaboidea. Zoological Survey of India, Kolkata, pp. 1-235.
- Stål C, 1860. Orthoptera species novas descripsit Forficulina. Eugenies Resa Omkring Jorden, Stockholm, pp. 299-307.
- Steinmann H, 1986. Dermaptera: Catadermaptera I. Das Tierreich: eine Zusammenstellung und Kennzeichnung der rezenten Tierformen. Vol. 102. Walter de Gruyter, Berlin, pp. 1-367.
- Steinmann H, 1993. Dermaptera: Eudermaptera II. Das Tierreich: eine Zusammenstellung und Kennzeichnung der rezenten Tierformen. Vol. 108. Walter de Gruyter, Berlin, pp. 1-711.
- Verhoeff KW, 1902. Über Dermapteren. 1. Aufsatz: Versuch eines neuen, natürlichen Systems auf vergleichend-morphologischer Grundlage und über den Mikrothorax der Insekten. Zoologischer Anzeiger, 25:181-208.
- Wu C, 1935. List of Chinese Dermaptera. Catalogus Insectorum Sinensium, 2:593-610.
- Yoon IB, Moon TY, 1996. Habitats and distribution of rare and endangered earwigs *Challia fletcheri* Burr in Korea. Korean Journal of Entomology, 26:403-409.
- Yoon IB, Moon TY, 1997. Conservation of Dermaptera in Youngnam region I. Choosing priority area by taxonomic root weighting and distribution analysis. Korean Journal of Biological Science, 1:305-311. <https://doi.org/10.1080/12265071.1997.9647370>

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